

What is claimed:

1. A multi-carrier receiver system, comprising:
 - a frequency conversion circuit for generating an intermediate frequency (IF) multi-carrier signal based on a transmission frequency multi-carrier signal;
 - a feedforward cancellation loop for generating an amplitude corrected multi-carrier signal based on the IF multi-carrier signal such that the amplitude corrected multi-carrier signal has a reduced dynamic range with respect to the IF multi-carrier signal; and
 - a primary analog to digital (A/D) converter for generating a digital multi-carrier signal based on the amplitude corrected multi-carrier signal.
2. The receiver system of claim 1 wherein the feedforward cancellation loop includes:
 - a secondary A/D converter for generating a digital cancellation signal based on the IF multi-carrier signal;
 - a level adjustment circuit coupled to the secondary A/D converter for digitally adjusting the digital cancellation signal such that carriers in the digital cancellation signal correspond to carriers in the IF multi-carrier signal having power levels above a predetermined threshold; and
 - a digital to analog (D/A) converter for generating an analog cancellation signal based on the digital cancellation signal.

3. The receiver system of claim 2 wherein the level adjustment circuit includes:

a secondary channelizer coupled to the secondary A/D converter for generating a plurality of single carrier signals based on the digital cancellation signal;

a level determine module coupled to the secondary channelizer for determining power levels of the single carrier signals;

a timing module coupled to the level determine module for synchronizing the single carrier signals with the IF multi-carrier signal;

a level adjust module coupled to the timing module for eliminating single carrier signals that correspond to carriers in the IF multi-carrier signal having power levels below the predetermined threshold, the level adjust module further adjusting power levels of single carrier signals that correspond to carriers in the IF multi-carrier signal having power levels above the predetermined threshold; and

an adjustment summer for digitally summing single carrier signals that have not been eliminated by the level adjust module.

4. The receiver system of claim 3 wherein the timing module adjusts time parameters of the single carrier signals.

5. The receiver system of claim 3 wherein the timing module adjusts phase parameters of the single carrier signals.

6. The receiver system of claim 3 wherein the level adjustment circuit further includes a phase lock loop connected between the D/A converter and the secondary channelizer for providing timing feedback to the secondary channelizer.

7. The receiver system of claim 2 wherein the feedforward cancellation loop further includes:

a splitter connected between the frequency conversion circuit and the secondary A/D converter for sampling the IF multi-carrier signal;

a cancellation filter coupled to the D/A converter for filtering a predetermined cancellation bandwidth from the analog cancellation signal; and

a cancellation summer connected between the cancellation filter and the frequency conversion circuit for adding the analog cancellation signal to the IF multi-carrier signal.

8. The receiver system of claim 7 wherein the cancellation filter is a bandpass filter.

9. The receiver system of claim 7 wherein the filter is a lowpass filter.

10. The receiver system of claim 1 further including:

a primary channelizer coupled to the primary A/D converter;

a cancellation feedback loop connected between the primary channelizer and the level adjustment circuit for providing cancellation feedback to the level adjustment circuit; and

a delay module for delaying the IF multi-carrier signal based on a processing time of the feedforward cancellation loop.

11. The receiver system of claim 1 wherein the frequency conversion circuit includes:

a first mixer for generating a preliminary IF multi-carrier signal based on the transmission frequency multi-carrier signal and a first oscillation signal;

a transmission filter for filtering a predetermined transmission bandwidth from the preliminary IF multi-carrier signal; and

a second mixer for generating the IF multi-carrier signal based on the preliminary IF multi-carrier signal and a second oscillation signal.

12. A feedforward cancellation loop comprising:

a secondary A/D converter for generating a digital cancellation signal based on an intermediate frequency (IF) multi-carrier signal;

a level adjustment circuit coupled to the secondary A/D converter for digitally adjusting the digital cancellation signal such that carriers in the digital cancellation signal correspond to carriers in the IF multi-carrier signal having power levels above a predetermined threshold; and

a digital to analog (D/A) converter for generating an analog cancellation signal based on the digital cancellation signal.

13. The cancellation loop of claim 12 wherein the level adjustment circuit includes:

a secondary channelizer coupled to the secondary A/D converter for generating a plurality of single carrier signals based on the digital cancellation signal;

a level determine module coupled to the secondary channelizer for determining power levels of the single carrier signals;

a timing module coupled to the level determine module for synchronizing the single carrier signals with the IF multi-carrier signal;

a level adjust module coupled to the timing module for eliminating single carrier signals that correspond to carriers in the IF multi-carrier signal having power levels below the predetermined threshold, the level adjustment module further adjusting power levels of single carrier signals that correspond to carriers in the IF multi-carrier signal having power levels above the predetermined threshold; and

an adjustment summer for digitally summing single carrier signals that have not been eliminated by the level adjust module.

14. The cancellation loop of claim 13 wherein the timing module adjusts time parameters of the single carrier signals.

15. The cancellation loop of claim 13 wherein the timing module adjusts phase parameters of the single carrier signals.

16. The cancellation loop of claim 13 wherein the level adjustment circuit further includes a phase lock loop connected between the D/A converter and the secondary channelizer for providing timing feedback to the secondary channelizer.

17. The cancellation loop of claim 12 further including:

a splitter connected between a frequency conversion circuit and the secondary A/D converter for sampling the IF multi-carrier signal;

a cancellation filter couple to the D/A converter for filtering a predetermined cancellation bandwidth from the analog cancellation signal; and

a cancellation summer connected between the cancellation filter and the frequency conversion circuit for adding the analog cancellation signal to the IF multi-carrier signal.

18. A method for receiving a transmission frequency multi-carrier signal, the method comprising the steps of:

generating an intermediate frequency (IF) multi-carrier signal based on the transmission frequency multi-carrier signal;

generating an amplitude corrected multi-carrier signal based on the IF multi-carrier signal such that the amplitude corrected multi-carrier signal has a reduced dynamic range with respect to the IF multi-carrier signal; and

generating a digital multi-carrier signal based on the amplitude corrected multi-carrier signal.

19. The method of claim 18 further including the steps of:
 - generating a digital cancellation signal based on the IF multi-carrier signal;
 - digitally adjusting the digital cancellation signal such that carriers in the digital cancellation signal correspond to carriers in the IF multi-carrier signal having power levels above a predetermined threshold; and
 - generating an analog cancellation signal based on the digital cancellation signal.